RIGID RECLOSABLE BACON PACKAGE

FIELD OF THE INVENTION

[0001] The present invention relates to packaged bacon products, more particularly to reclosable packages for shingled bacon slices.

BACKGROUND OF THE INVENTION

[0002] Bacon has long been available to retail consumers in sliced form, often within sealed packages containing sliced bacon in a shingled array. These bacon packages are often vacuum-sealed. Typically, a provision is made for viewing a portion of some of the shingled bacon slices.

[0003] A prior bacon package of this type is shown in Seiferth et al. U.S. Pat. No. 3,803,332. A stack of bacon slices is arranged in a shingled relation on a backing board, which usually is non-transparent, and the bacon slices are enclosed between transparent top and bottom flexible plastic wrapper sheets having their marginal portions sealed to each other about the periphery of the backing board. The space between the wrapper sheets typically is vacuumized. For merchandising, the wrapped bacon typically is placed inside a paperboard carton having a cut-out window for viewing the plastic wrapped bacon.

[0004] In such prior bacon packaging arrangements, much of the surface area of the packaged bacon slices is not visible to store customers. In making their purchasing decisions, many consumers would like to be able to visually inspect more of the bacon slices through the packaging, e.g., to obtain an indication of their relative lean and fat contents.

[0005] Another concern is that the flexible plastic wrapper bacon packages make it difficult to avoid contact between a consumer's fingers and oily inner packaging surfaces when the consumer is removing a bacon slice or slices from inside the package. Usually, in order to gain access to a bacon slice, the consumer must open and hold open a package panel or otherwise touch a part of an inner package surface that has a fatty oil film resulting from previous contact with the enclosed bacon. This contact with a fatty oil film on an inner package surface may occur when a consumer initially opens the package,

when accessing a previously opened package, and/or when holding open a package during removal of a bacon slice or slices from the package. Customers may want to minimize their direct hand contact with oily surfaces.

[0006] Prior bacon packages of the type described above are difficult to reseal, once opened, as they do not have positive means by which the package can be reclosed in order to sealingly contain the remaining bacon strips within the package once it has been opened.

[0007] There is a need for reclosable bacon packages that provide enhanced product visibility and reduce or eliminate consumer hand contact with oily package surfaces.

SUMMARY OF THE INVENTION

[0008] The invention provides a reclosable package for displaying a shingled stack of sliced bacon in a highly visible manner, including a generally rigid tray member for receiving the bacon and a generally rigid cover member that are reclosably sealed together.

[0009] In one embodiment, a reclosable bacon package includes a tray member having a tray base, generally upstanding tray sidewalls, and generally upstanding tray endwalls, and a tray member peripheral flange which surrounds an open mouth located generally opposite the tray base. The tray base comprises a generally flat central base portion disposed between two inclined base portions which merge with the generally upstanding tray sidewalls at respective locations below the tray member peripheral flange. In this manner a lower recess is provided within the tray member to receive a stack of shingled bacon while leaving head space above the bacon. A peripheral ledge portion extends along the inner (food side) surface of the sidewalls and endwalls adjacent the mouth of the tray member.

[0010] A cover member is inserted partly within the mouth of the tray member and above the bacon to reduce air space within the packaged enclosure, and is releasably securable onto the tray member. The cover member includes a cover panel, a cover member peripheral flange, and a peripheral inset portion joining and spacing the cover panel and the cover member peripheral flange. The cover panel and peripheral inset portion of the cover member are slidably insertable a limited distance within the tray member along the peripheral ledge portion thereof until the peripheral flange of the cover member seats on the peripheral flange of the tray member. When the cover member is seated on the tray member, an interior volume is defined having a volume and a shape

suitable for enclosing a stack of shingled bacon supported on the tray base. The multi-contoured tray base conforms well to the shape of a shingled stack of bacon to support and permit the stack of shingled bacon to be displayed through the cover member panel in a highly visible manner.

[0011] To provide for convenient and reliable reclosure of the package, the peripheral inset portion of the cover member includes projections that are releasably engageable in a snap-fitting manner with respective indentations on the tray member peripheral ledge, or vice versa, such that the cover member and the tray member may be releasably locked together, even after an original package seal is broken.

[0012] As will be appreciated, the invention provides reclosable packages for shingled bacon slices or other bacon products which are displayable with high product visibility, and which may be repeatedly opened, securely reclosed, and handled without a consumer's fingers needing to contact inner surfaces of the package that may have fat residue thereon. These advantages, among others, may help to increase consumer interest in and satisfaction with the packaged product.

[0013] The invention also provides a method for packing shingled bacon slices, using the reclosable container. In one embodiment, the method steps may include providing a reclosable package as described herein, introducing shingled bacon slices into the rigid tray member, optionally flushing the container with inert gas, and, covering the rigid tray member with a cover member having a cover member peripheral inset portion that includes a plurality of projections or indentations releasably engageable with indentations or projections on a tray member peripheral ledge for releasably closing together the cover member and the tray member.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] In the course of this description, reference is made to the attached drawings, wherein:

[0015] FIG. 1 is perspective view of a reclosable bacon package in accordance with one embodiment of the present invention.

[0016] FIG. 2 is a cross-sectional view along the section 2-2 of Fig. 1.

[0017] FIG. 3 is a cross-sectional view along the section 3-3 of Fig. 1.

[0018] FIG. 4 is an enlarged partial sectional exploded view of the cover member of the bacon package of FIG. 1.

[0019] FIG. 5 is a bottom plan view of the cover member.

[0020] FIG. 6 is a perspective view of the tray member of the bacon package of FIG. 1.

[0021] FIG. 7 is a bottom view of the tray member of FIG. 6.

[0022] FIG. 8 is a top view of the tray member of FIG. 6.

[0023] FIG. 9 is a cross-sectional view taken along section A-A of tray member of FIG. 8, as situated on a mold used for making same.

[0024] FIG. 10 a top view of a portion of the package flange area showing an optional easy-access opening feature of the bacon package of FIG. 1.

[0025] FIG. 11 is a perspective view of a sealed reclosable bacon package in accordance with another embodiment of the present invention.

[0026] FIG. 12 is an enlarged cross-sectional view of lidstock and tray stock film laminates useful for constructing a bacon package in accordance with FIG. 1 or FIG. 11.

[0027] FIG. 13 is a flow chart of a method for manufacturing the sealed reclosable bacon package of FIG. 1 or FIG. 11.

[0028] The figures and features depicted therein are not necessarily drawn to scale. It also will be appreciated that use of relative spatial descriptions herein such as upper, lower, above, beneath, and the like, are used merely for convenience to simplify the illustration under discussion, and are not necessarily limiting. Similarly numbered elements in different figures represent like features unless indicated otherwise.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0029] Referring to FIG. 1, a shaped, generally rigid synthetic plastic package **10** for storing and displaying a shingled stack of bacon slices **13** in accordance with an embodiment of the present invention is shown, which includes a tray member **11** and a cover or lid member **12**. Both tray member **11** and cover member **12** are of film construction in which the film is semi-rigid or rigid and has been shaped or is shaped in-line, such as by suitable forming or heat molding techniques, into the shapes illustrated in the drawings. The terms "rigid" and "semi-rigid" are used herein to indicate that the structures made of these films have the ability to retain their respective shapes during normal handling. The tray member **11** has a pair of opposite longitudinal sidewalls including sidewall **110**, and a pair of opposite endwalls including endwall **120**. Thus, the

tray member **11** and cover member **12** may provide a protective display package for a shingled stack of bacon slices. The shingled stack of bacon slices **13** is sealed within package **10**, which bacon slices may be uncooked, partially cooked or fully cooked. The term "bacon," as used herein may refer to meat-containing or meatless bacon.

[0030] At least one of the cover member **12** and tray member **11** is preferably transparent to the extent that portions of bacon supported within the package **10** can be readily viewed and inspected by a consumer prior to purchase. In the embodiment illustrated in FIGS. 1-10, both the tray member **11** and the cover member **12** are illustrated as being transparent. In other embodiments, they may be partially or entirely opaque. Preferably, at least the cover member is transparent.

[0031] One or more label(s) **20** may be included in order to satisfy marketing and regulatory labeling needs and requirements. The labels may comprise opaque backings including legible print thereon. Alternatively, one or more of such labels may be partially transparent or maybe partially or entirely translucent. In one embodiment, pressure sensitive labels are used, which may be affixed to an exterior side of the cover member, tray member, or both. Alternatively, the labels may be affixed to an interior (food side) surface of transparent package components. In another alternative, print is affixed directly on a layer of a film comprising a package component.

[0032] As shown in FIG. 2, cover panel **17** of the cover member **12** is inset. A peripheral flange **15** of the cover member **12** is spaced away from the cover panel **17** by a peripheral inset portion **16**. Cover member flange **15** rests in contact on tray member flange **14**. In this manner, the cover panel **17** projects into the tray member **11** when the package **10** is in its closed condition. A well **1600** is defined within the upper surface (non-food side) **161** of cover member **12** with cover panel **17** at its bottom and peripheral inset portion **16** defining its lateral sides.

[0033] As shown in FIG. 3, the base **130** of the tray member **11** comprises a generally flat central base portion **133** disposed between two inclined base portions **131** and **132** which merge with the opposite tray sidewalls **110** and **111**, respectively, at respective locations below the tray member peripheral flange **14**. The shingled bacon **13** is stacked on the base **130** such that a slice of bacon **134** at one end of the package is reposed in a substantially horizontal position such that the upper face **135** thereof is readily visible.

[0034] In one embodiment, a sliding friction fit is made between peripheral inset portion **16** of the cover member **12** and an inner peripheral ledge portion **141** of the tray

member **11** which provides a positive acting reclosure feature by which the consumer has an audible acknowledgement and or tactile experience of closure completion by having a tight fitting arrangement. The peripheral ledge portion **141** also is shown in FIG. 6, which is discussed in more detail below.

[0035] Referring to FIG. 4, in this embodiment, this closure feature comprises a projection **152**, such as a rib or other protuberance, along peripheral inset portion **16** of the cover member **12**. The bottom surface **150** of the flange **15** is indicated in this view. The projection **152** of the peripheral inset portion **16** of the cover member **12** is received within a corresponding indentation, such as a groove, formed along the peripheral ledge portion **141** of the tray member, as will be discussed in more detail hereinafter.

[0036] In a preferred embodiment, a plurality of such projections are provided along peripheral inset portion **16** at least at one set of opposite outer sides of the peripheral inset portion **16** of the cover member **12**, which can engage a plurality of corresponding indentations provided along the peripheral ledge portion **141** of the tray member at opposite inner sides of the tray member.

[0037] Referring to FIG. 5 in this respect, a transparent cover member **12** is shown with the above-noted bottom surface **150** of peripheral flange **15**, cover panel **17**, and the peripheral inset portion **16**. In this illustration, a plurality of projections **1520** and **1521**, which may be similar to above-described projection **152**, are integrally formed on opposite sides **501** and **502** of the peripheral inset portion **16**, and a plurality of projections **1522** and **1523**, also which may be similar to above-described projection **152**, are integrally formed on the other set of opposite sides **503** and **504** of the peripheral inset portion **16**. Alternatively, projections may be provided on only one set of the opposite sides of inset portion **16**, but not on both sets of opposite sides. In another option, projections are provided at the corners of inset portion **16** (not shown). The purpose and function of these projections will become more apparent in the following discussion of the container tray member.

[0038] Referring to FIG. 6, tray member **11** as shown includes longitudinal sidewall **111** which merges or intersects with tray base portion **132** at a location **139** below flange **14**, and opposite longitudinal sidewall **110** similarly merges with base portion **131**. A plurality of grooves **162** are provided along the peripheral ledge portion **141** along the longitudinal sidewall **111** of the tray member **11**, and at the opposite longitudinal sidewall **110** of the tray member (which are hidden in this view). These grooves are adapted to

receive corresponding ribs **1520** and **1521** provided along the peripheral inset portion **16** of the cover member **12** (see FIG. 5).

[0039] As shown in FIG. 6, a plurality of grooves **168** are also provided along the peripheral ledge portion **141** where it extends along the endwall **120** of the tray member **11**, and at the opposite endwall **121** of the tray member (which are hidden in this view). These grooves are adapted to receive corresponding ribs **1522** and **1523** provided on the peripheral inset portion **16** of the cover member **12** (see FIG. 5).

[0040] Grooves **162**, **168**, and those provided on the opposite walls thereto, are integrally located on the inner (food side) surface **137** of the sidewalls and endwalls of the tray member **11** at locations below and relatively close to the tray's mouth **164** which is located at the flange surface level **140** of the tray member **11**. In this illustration, the grooves **162** and **168** are located very close to the mouth **164** with only a narrow intervening ungrooved section **138** of endwall or sidewall separating them. In this illustration, the ribs and grooves extend generally sideways (i.e., laterally) relative to the container parts. Alternatively, grooves may be provided in opposing sidewalls or opposing endwalls, but not in both sets of walls. In another option, grooves are provided in tray member corners (not shown).

[0041] To releasably attach the cover member **12** to the tray member **11**, the cover panel **17** may be inserted a distance downward within the cavity **160** of tray member **11** until its flange **15** comes to rest on tray flange **14**, and the ribs **1520** are releasably lodged within grooves **162**, and similarly with respect to the other cover member rib and tray member groove combinations such as described herein. This releasable closure and reclosure of the tray and cover members can be conveniently done by manual manipulation of the cover member and tray member by a user.

[0042] A plurality of such corresponding ribs and grooves may be provided along the inset portion **16** of the cover member **12** and along the peripheral ledge portion **141** of the tray member **11** in segmented form, or, alternatively, the respective ribs and grooves may be formed as continuous features that encircle or substantially encircle the entire peripheral inset portion **16** of the cover member and below peripheral ledge portion **141** of the tray member. In one embodiment, the grooves **162**, **168**, and so forth, are formed as segments in tray member **11** which extend generally horizontally at substantially the same vertical distance from the base **130** of the tray member **11**.

[0043] It also will be appreciated that the placement of these snap-fitting engagement structures may be reversed such that the peripheral inset portion of the cover member has indentations which releasably snap into projections provided on the peripheral ledge portion of the tray member. Also, the number and location of the various interlocking grooves and ribs shown in this illustration is exemplary, and is not intended to be limiting.

[0044] Referring still to FIG. 6, a plurality of protuberances or "feet" **123** may be molded into the bottom side of the tray member **11**. Multiple containers as described herein may be more conveniently and easily stacked by forming the feet **123** on tray **11** of container **10** at positions which may be conformably nested from above within a well **1600**, such as indicated above (e.g., FIG. 2), which is molded into the cover member **12** of an underlying separate container having a similar construction, effective to restrict lateral movement of the feet **123** of the overlying tray member.

[0045] Referring to FIG. 7, feet **123** on a tray member **11** are shown in further detail. The feet arrangement shown is merely illustrative and not limiting. The central base portion **133**, inclined base portions **131** and **132**, and tray member flange **14** of tray member **11** are also indicated, as well as molded indentations **1620** and **1680** which define above-noted grooves **162** and **168**. In this illustration the feet **123** have slightly sloping sides **1231** that merge with underside (non-food side) **1300** of the tray base **130**, although such sloping sides are not required. The feet **123** generally are upraised a distance from inclined base portions **131** and **132** which is at least approximately level with flat central base portion **133**, and may optionally extend beyond base portion **133** a distance that can be accommodated by the depth of a well (**1600**) of an underlying cover member of another container to which it makes contact in a container stacking arrangement (not shown). In an alternative embodiment, the feet may be omitted, and, for example, the bottom side of the tray member **11** may have the profile such as shown by FIG. 3 at the end walls **120** and **121** as well as the intervening bottom side portions comprising base portion **133** and inclined base portions **131** and **132**.

[0046] Referring to FIG. 8, the tray member **11** is illustrated having the pair of sidewalls **110** and **111**, the pair of endwalls **120** and **121**, and the base **130**, which together define a cavity **160** into which a stack of shingled bacon may be disposed and supported. As illustrated, the tray sidewalls, endwalls, and base are unified within a common integral tray structure, such as a molded or thermoformed plastic structure. The tray member's peripheral flange **14** extends along upper exposed ends of the sidewalls **110**, **111** and

endwalls **120, 121** to provide a generally flat rim-like sealing and closure surface **140** for attachment of the cover member **12** via its flange **15** to enclose the shingled bacon within the cavity **160**.

[0047] As shown in FIG. 8, grooves **162** (indicated in phantom lines) in sidewall **111** and grooves **163** (indicated in phantom lines) in opposite sidewall **110** are formed in the peripheral ledge portion **141**, and grooves **168** (indicated in phantom lines) in endwall **120** and grooves **169** (indicated in phantom lines) in opposite endwall **121** are also formed in the peripheral ledge portion **141**. These sets of grooves can be releasably engaged with corresponding ribs formed around the peripheral inset portion **16** of cover member **12**.

[0048] As also illustrated in FIG. 8, the base **130** of the tray member **11** is shown with inclined base portions **131** and **132** having lengthwise dimensions which extend generally parallel to direction "X", and which extend across most of the space between the endwalls **120** and **121** of the tray member. Preferably, inclined base portions **131** and **132** extend a lengthwise distance sufficient to minimize sagging of any parts of the stack of shingled bacon off inclined base portions **131** or **132**. The inclined portions are shown as continuous surfaces. Alternatively, they may also be implemented as intermittent upraised portions (not shown) which are sufficient to support one or the other ends of a stack of bacon slices without significant product sagging. The lengthwise direction of individual slices of bacon within a common stack placed in tray member **11** run in a direction generally parallel to the "X" direction indicated in FIG. 8. The lengthwise dimension of tray base **130** in direction "X" preferably will accommodate the bacon slice length.

[0049] FIG. 8 also shows inclined base portion **132** with gently downward sloping sidewalls **1321** which have a rounded portion **1322** near sidewall **111**. It will be appreciated that the inclined base portion alternatively could have a non-sloping triangular-shaped sidewall oriented at approximately a right angle to the base **130**, or other suitable geometry. Base portion **131** generally has similar sidewall arrangements.

[0050] Referring to FIG. 9, tray member **11** is shown in a thermoformed configuration while still situated on a mold **113** used to impart the desired shape, such as by using techniques described in more detail subsequently herein. The tray member **11** is sufficiently rigid to retain the imparted molded shape after its removal from the mold **113**. The base **130** of the tray member **11** comprises a generally flat central base portion **133** disposed between two inclined base portions **131** and **132** which merge with the generally upstanding tray sidewalls **110** and **111**, respectively, at respective locations below the tray

member peripheral flange **14**. The open mouth **164** of the tray member opposite base **130** has a dimension **170** sufficient to conformably receive a stack of shingled bacon. The dimension **170** extends generally perpendicular to the lengthwise direction of bacon slices placed as a stack within tray member **11**. In this illustration, inset regions may be molded into the bottom side of the tray member.

[0051] As illustrated in FIG. 9, inclined base portion **131** is designed with width **173** and inclination angle alpha (α). Inclined base portion **132** is designed with width **174** and an inclination angle of (90- beta (β)). Generally flat central base portion **133** has a width **175**. In one non-limiting embodiment, angles alpha (α) and (90- beta (β)) individually may range from about 20 to about 40 degrees. The inclination angle of the base portion that will be situated below a generally flat (horizontally-oriented) bacon slice of high surface area visibility, such as base portion **132** in FIG. 3, preferably has a relatively smaller, e.g., about 3 to about 10 degrees smaller, inclination angle than that of the other base portion to impart a flatter orientation of the bacon slices at that end. The inclined base portions **131** and **132** individually may have widths of about 50 to about 80% the width of the central base portion. In one embodiment, the relative width dimensions **173/175/174** of the base portions **131/133/132** are about 0.5-0.6/1.0/0.7-0.8, respectively.

[0052] As may be better appreciated by reference again to FIG. 3, the multi-contoured tray base **130** is configured with inclination angles and with widths such that a stack of shingled bacon **13** may be conformably inserted upon base **130**, whereby the stack of bacon slices may be stacked up a gradually declining angle relative to cover panel **17** from back-to-front (i.e., from base portion **131** to base portion **132**) within the package. Consequently, as noted, at least one bacon slice **134** lies substantially flat above base portion **132** so that a potential purchaser may readily view one of its surface faces **135**, and not merely an edge portion thereof. This permits a potential purchaser to more readily observe the relative amount of lean portion and fat portion of a representative bacon slice.

[0053] Referring again to FIG. 9, lower recessed portion **165** is the space defined between plane **166** and the multi-contoured base **130**. Recessed portion **165** has a depth **172** sufficient to accommodate most of the expected thickness of a stack of shingled bacon, when supported on base **130**. In one embodiment, not all the bacon stack fits within recessed portion **165**, but all the bacon does generally fit within the closed container **10** when the cover member **12** is attached to the tray member **11**. Also, plane **166** is shown as oriented generally parallel to base portion **133**, although it will be appreciated that a

parallel relationship is not required as long as recessed portion **165** is sized sufficiently to receive a stack of bacon. Distance **171** generally corresponds to the vertical height dimension of the longitudinal sidewalls **110** and **111**, which is less the vertical height (the sum of distances **171** and **172**) of the endwalls **120** and **121**. The distance **171** is at least equal in magnitude to the separation distance that the peripheral inset portion **16** of cover member **12** creates between the cover flange **15** and cover panel **17**. The cover panel and peripheral inset portion of the cover member thus are conformably insertable within the tray member until the peripheral flange **15** of the cover member seats on the peripheral flange **14** of the tray member, and a plurality of ribs (**1520**, **1521**, **1522**, **1523**) on cover member peripheral inset portion **16** are manually snapped into the sets of grooves (**162**, **163**, **168**, **169**) at the upper peripheral ledge **141** of tray member **11**.

[0054] Therefore, when tray member **11** supports a stack of shingled bacon on base **130**, a cover member **12** may be snap-fitted into place upon the tray member. These tray features permit a stack of shingled bacon to be supported in position within tray member **11** and displayed through the packaging in a highly visible, orderly manner. In one embodiment, the cover member **12** is structured such that its panel member **17** touches the bacon and applies force thereto to aid in maintaining the bacon shingle through the bacon distribution/purchase cycle.

[0055] With this arrangement in accordance with the present invention, more bacon slice surface area is visible to the consumer prior to purchasing and opening the package of bacon. The reclosable package helps keep product fresh after opening. The combination of rigid plastic tray member and rigid plastic lid, as described herein, allows reclosure of the package after the consumer opens the hermetic seal of a gas-flushed package. The generally rigid constructions of both the tray and cover members, together with the provision of the above-noted closure features at the flanges of the components, also may permit a consumer to open and reopen the package with minimized hand contact occurring or needed with interior surfaces that may be coated with fat residue.

[0056] In another embodiment, the bacon slices are easier to separate because the package is gas flushed and the rigidity helps prevent the bacon from being pushed together. The form of the tray member also holds the slices in a shingle arrangement and still lays the last slice flat to allow easy access and removal. If desired this slice may be made visible by moving the face label and the tray member material may be made of less expensive non-transparent material. In one non-limiting embodiment, the cover member

comprises transparent plastic, and any labeling placed on the transparent cover member is positioned such that at least about 70% or more of at least one bacon slice contained in the package remains viewable through the cover member.

[0057] In one embodiment, a structural feature is included as an integral part of the flange of either the tray member or the cover member components as a means to facilitate initiation of manual peeling of the components apart at their sealed flanges. Referring to FIG. 10, one optional mechanism used to facilitate manual opening of the sealed or closed container may be small upraised projection or bump **143** provided in a corner **145** of flange **14** of tray member **11**, which feature makes it easier to start peeling the sealed flanges apart using digital manipulation.

[0058] A generally known easy-open mechanism that optionally may be used is a lateral cut-out formed in the cover member flange that laterally extends inward relative to the outer perimeter of the adjoining tray flange (not shown), which provides an easier site from which to initiate manual peeling of the components apart.

[0059] The tray member may be transparent plastic, semi-transparent plastic, or opaque plastic. If the tray member is not transparent plastic, then the cover member must be transparent plastic and any labeling placed on the cover member preferably should permit at least about 70% or more of at least one bacon slice to be viewable from that perspective.

[0060] FIG. 11 shows an alternative embodiment of the present invention in which a reclosable bacon package **100** has features similar to those described herein relative to FIGS. 1-10, except that a colored or opaque (i.e., non-transparent) tray member **11** is used in combination with transparent cover member **12**. Although not required, a plurality of vertically-oriented wall ribs **103** may be integrally molded into the tray member endwalls (and or sidewalls) for additional structural reinforcement in embodiments of the present invention.

[0061] In these non-limiting illustrations, the tray member has a generally rectangular-shaped profile (from a top view perspective). Other package profiles may be used, depending on the dimensions of the shingled stack of bacon slices and to the extent a profile accommodates the multi-contoured tray base used in accordance with this invention to help display the package contents. For example, if the shingled stack of bacon strips has a size similar to that of the lengths of the individual bacon strips, then a more

squared-shaped profile may be suitable for the tray member. The profile of the cover member usually generally corresponds to that of the tray member.

[0062] The cover member and tray member independently can be made from a variety of materials including homogenous plastic films, plastic films provided with heat sealable coatings, multi-layered film laminates, and/or co-extruded films, and the like. In one embodiment, packaging material useful for the cover member and tray member generally is a multi-layered plastic film construction suitable for packaging of refrigerated meat products including at least (a) a thin, intermediate layer which is substantially impervious to oxygen, in combination with (b) an outer structural layer having sufficient structural characteristics so that the laminate is sufficiently rigid for shape retention during handling, and usage of integral snap-fit closure features included with the package, and (c) a sealant layer suitable for heat sealing procedures.

[0063] In one embodiment convenient for larger scale production, the tray member and cover member separately may be manufactured as respective thermoformable multi-layered webs, which may be supplied as roll stock and run on a form-fill-seal machine, or the like. In one preferred embodiment, the cover member and tray member container components are each made with a respective multi-layer film construction.

[0064] In one particular embodiment, the cover member **12** is a transparent multi-layer film construction, and the tray member **11** is a transparent or colored multi-layer film construction.

[0065] Referring to FIG. 12, in one non-limiting example, a scheme of layers of the transparent multi-layer film **200** useful to construct a cover member is: outer structural layer **201**/primer **202**/ethyl vinyl acetate copolymer (EVA) layer **203**/tie resin **204**/ethylene vinyl alcohol (EVOH) copolymer barrier layer **205**/tie resin **206**/sealant layer(s) **207**. In one embodiment, the cover member multi-layer film generally may have a thickness of about 5 to about 20 mils, and particularly about 8 to about 12 mils.

[0066] In the construction of a transparent cover member, the outer (i.e., opposite to the food side) structural layer **201** of the multi-layer film used to construct the cover member may be a relatively rigid plastic material that will substantially retain a shape that will be thermoformed therein. Non-limiting examples of the outer structural layer include amorphous polyester (e.g., amorphous polyethylene terephthalate), polypropylene, polystyrene, polyester copolymers such as polyethylene terephthalate glycol (e.g., Vivak®), styrene-butadiene copolymers (e.g., K-resin®), or acrylonitrile (e.g., Barex®).

The outer structural layer **201** may have a thickness of about 6 to about 12 mils. In transparent container components, these plastics will be clear and non-colored.

[0067] Enhanced oxygen barrier properties generally are imparted in the multi-layer film used to construct the cover member by providing an intermediate barrier layer **205**. For example, the intermediate barrier layer may be an ethylene vinyl alcohol copolymer (EVOH) layer, or a coating of polyvinylidene chloride (e.g., Saran®, from Dow Chemical). The EVOH layer may be combined with an intermediate ethyl vinyl acetate (EVA) layer **203** via a tie resin **204** towards the outside (non-food side) of the multi-layer film **200**, and the EVA layer in turn is attached to the outer structural layer. The EVA layer may be primed with an adhesive or solvent primer **202** suitable to assist its attachment to the outer structural layer **201**, or, alternatively they may be thermally laminated, co-extruded, or the like.

[0068] The tie resin may be generally known compositions used for attaching two layers in multi-layer packaging films. Such tie layers are internal film layers which those of skill in the art recognize as being compatible with other compositions, i.e., suitable for direct adhesion to other types of plastic layers commonly used in packaging films. Tie layers may include polymers having grafted polar groups so that the polymer is capable of covalently bonding to polar polymers. Useful polymers for tie layers include ethylene/unsaturated acid copolymer, ethylene/unsaturated ester copolymer, anhydride-modified polyolefin, polyurethane, and mixtures thereof. One particular non-limiting example of polymers for tie layers include one or more of ethylene/vinyl acetate copolymer having a vinyl acetate content of at least 15 wt.%, ethylene/methylacrylate copolymer having a methyl acrylate content of at least about 20 wt.%, anhydride-modified ethylene/methyl acrylate copolymer having a methyl acrylate content of at least 20 wt.%, and anhydride-modified ethylene/alpha-olefin copolymer, such as an anhydride grafted LLDPE. The tie layers are of sufficient thickness to provide the adherent function, as is known in the art. Each tie layer may be of a substantially similar or a different composition and/or thickness.

[0069] A sealant layer **207** is provided on the opposite, food side of the multi-layer film used to construct the cover member relative to the outer structural layer. The sealant layer may be joined to the intermediate EVOH barrier via a tie resin. The sealant layer is used in heat-sealing the cover member to the tray member after the tray member is filled with bacon or other foodstuff.

[0070] Heat sealable materials usually are thermoplastic film-forming polymers, and are well known in the art. The heat sealable materials must be compatible with the layer to which it is going to be sealed or heat-sealed. They may desirably include ethylene polymers and copolymers, and copolymers of ethylene and an ethylenically unsaturated comonomer selected from the group of carboxylic acids and esters, salts and anhydrides thereof. Examples of suitable sealant polymers include, for example, ionomers, and sealant materials selected from ethylene vinyl acetate (EVA), ethylene methyl acrylate (EMA), low density polyethylene, linear low density polyethylene, and blends of HDPE with EVA or with EMA, and the like. Ionomers are advantageous in the sealing layer of a film or web because they melt at relatively low temperature, produce a relatively strong heat seal, and may be used for rupturable sealant layers. Ionomers generally are metal-neutralized copolymers of an olefin and a carboxylic acid. More particularly, they may be metal salts of ethylene-acrylic or methacrylic acid copolymers having pendant carboxylate groups associated with monovalent or divalent cations such as sodium or zinc. Commercially-obtained ionomers that are suitable for packaging film applications include, for example, Surlyn® from E.I. du Pont de Nemours and Co.

[0071] In one preferred embodiment, the sealant layer is a sodium or zinc ionomer layer which contains or is coated with an anti-fog agent. The anti-fog agent helps keep the layer clear of condensed water droplets. Suitable anti-fog agents are generally known and may fall into classes such as esters of aliphatic alcohols, esters of polyglycol, polyethers, polyhydric alcohols, esters of polyhydric aliphatic alcohols, polyethoxylated aromatic alcohols, nonionic ethoxylates, and hydrophilic fatty acid esters.

[0072] The sealant film material may be a continuous layer, or alternatively only applied around the periphery of the multi-layer construction where it will correspond at least to the flange portion of the package part that will be molded or thermoformed with the multi-layer film. Generally, the sealant layers may have a thickness between about 0.1 mils to about 0.5 mils, although other thicknesses are not excluded. In one embodiment, the combination of the EVA/tie/EVOH/tie/ionomeric sealant layer(s) of the multi-layer film (i.e., the stack of layers not including the outer structural layer) used for cover member constructions may have a total thickness of about 1.25 to about 4 mils.

[0073] Optionally, one or more of the barrier and sealant layers, or at least a portion of the entire sealant and/or barrier layers may be cross-linked to improve the strength of the film, improve orientation of the film, and help to avoid burn-through during heat seal

procedures. Cross-linking may be achieved by using chemical additives or subjecting one or more film layers to one or more energetic radiation treatments, e.g., ultraviolet radiation or electronic beam treatment, to induce cross-linking. Useful radiation dosages for this purpose are generally known in the art.

[0074] Also optionally, all or a portion of one or two surfaces of the sealant and/or barrier layers optionally may be corona and/or plasma treated by methods known in the art to change the surface energy of the film, for example, to increase the ability to print or laminate the film.

[0075] The outer structural layer, EVA, barrier, and sealant films may each be separately manufactured by thermoplastic film-forming processes generally known in the art, such as extrusion or casting. The non-amorphous films may be machine-direction oriented, transverse-direction oriented, or, preferably, biaxially oriented. The multi-layer films may be consolidated together as an adhesively laminated web.

[0076] Referring still to FIG. 12, the package tray member may be a transparent or colored construction. In one non-limiting example, the scheme of layers of a multi-layer film **210** may be used in manufacturing a tray member, which comprises a (colored) outer structural layer **211**/EVA **212**/tie resin **213**/EVOH barrier **214**/tie resin **215**/multifilm sealant layer **218** comprised of sealant sublayers **216** and **217**. In one embodiment, the tray member multi-layer film generally may have a thickness of about 10 to about 25 mils, and particularly about 12 to about 18 mils.

[0077] In one embodiment, multi-layer films useful for constructing colored or transparent tray members are provided with an outer (i.e., opposite the food side) structural layer **211** useful for imparting rigidity and shape retention. If the multi-layer film will be used to construct a colored tray member, the outer structural layer may be colored, such by incorporating colorant and or pigment to impart opacity in the layer. In one embodiment, an outer structural layer **211** used to impart structural rigidity in webs for tray member constructions may comprise a high impact polystyrene (HIPS), polystyrene, polyester (e.g., colored polyester terephthalate), high density polyethylene (HDPE), polypropylene polyester copolymers such as polyethylene terephthalate glycol (e.g., Vivak®), styrene-butadiene copolymers (e.g., colored K-resin®), or acrylonitrile (e.g., Barex®).

[0078] In one preferred embodiment, a HIPS material (colored or transparent) is used for the outer structural layer of the tray member as it combines useful functionality and

cost attractiveness. The outer structural layer **211** of the tray member may have a thickness of about 8 to about 24 mils. The colorant, when incorporated in the outer structural layer, may be a compatible pigment or dye that may be blended or dispersed in an amount effective to impart opacity to outer structural layer. Alternatively, an intermediate coloration layer (not shown), such as an ink layer, may be disposed between the outer structural layer and a sealant layer provided on the opposite face of the same film laminate.

[0079] For the multi-layer films used for tray member construction, enhanced oxygen barrier properties also may be imparted by providing an intermediate barrier layer **214**, such as an ethylene vinyl alcohol copolymer (EVOH) layer or a coating of polyvinylidene chloride ("Saran®", from Dow Chemical). The EVOH layer may be combined with an ethyl vinyl acetate (EVA) layer **212** via an intervening tie resin layer **213**, on the side of EVOH layer nearest the outer structural layer. The EVA layer **212** is attached to the inner (food-side) of outer structural layer **211**, and, again, a primer (not shown) may be used to facilitate the interfacial attachment thereof, or, alternatively they may be thermally laminated or co-extruded, and the like.

[0080] A sealant layer **218** is provided on the opposite food side of the EVOH layer of the same multi-layer film to be used in manufacturing a tray member. The sealant layer **218** may be joined to the EVOH barrier **214** via a tie resin **215**. The sealant layer is used for heat-sealing the tray member to the cover member after the tray member is filled with bacon or other foodstuff. The sealant layer may comprise the above-noted materials used with respect to the cover member web. In one preferred embodiment, the sealant layer used in the tray member web comprises a sodium or zinc ionomer layer which contains an anti-fogging agent. In one embodiment, the combination of the EVA/tie resin/EVOH/tie resin/ionomeric sealant layer(s) may have a total thickness of about 1.25 to about 4 mils.

[0081] In a preferred embodiment, at least one of the sealant layer constructions **207** or **218** provided on the food side of either the multi-layer film for cover member constructions or the multi-layer film for tray member constructions comprises a rupturable multi-film sealant layer construction. In an embodiment of rupturable multi-film sealant layer construction illustrated in FIG. 12, sealant layer **218** comprises an outer (i.e., food side) sealant sublayer **217** which is attached to an adjoining inner base member sealant sublayer **216**. In one embodiment the sealant sublayer **217** is comprised of a similar material and is selected from the same group of materials, and in a similar thickness, as

described above relative to sealant layer **207**. The various films used in package walls **210** and **200** are selected such that the base member sealant sublayer **216** adheres less strongly to the remainder of the multi-layer film **210** or alternatively outer sealant layer **217**, than the bond formed between outer sealant layers **217** and **207**. Therefore, when a peel force is applied to the sealed flange areas of the cover member and tray member, the seal ruptures along the inner base member sealant sublayer **216** such that the cover member and tray member become physically separable.

[0082] The difference in adhesion properties is provided in these sealant sublayers by selection of their respective formulations. For example, the outer sealant sublayer **217** and sealant layer **207** may be formulated to comprise approximately 100% neutralized ethylenic acid copolymer sealant materials, such as sodium or zinc ionomer sealant materials, that are not blended or essentially unblended with other types of sealant polymers. The base member sealant sublayer **216** may be formulated, for example, as generally comprised of a combination of polybutylene and either ethylene vinyl acetate copolymer (EVA), linear low density polyethylene (LLDPE), neutralized ethylene acid copolymer or unneutralized ethylene acid copolymer. For instance, the sealant sublayer **216** may be formulated as a blend of polybutylene and EVA, or polybutylene and LLDPE. The polymer blend proportions for the base member sealant sublayer **216** may vary, but generally may include about 5 wt.% to about 30 wt.% polybutylene, and about 95 wt.% to about 70 wt.% of the different sealing polymer material such as EVA and or LLDPE. For example, in one embodiment, base member sealant sublayer **216** may comprise about 86-90 wt.% LLDPE or EVA, and about 14 to about 10 wt.% polybutylene.

[0083] The rupture force needed to separate (peel) the sealant sublayers apart, as provided on the food side of either the cover member or tray member, should not cause tears nor delamination elsewhere in the container components; nor should it leave a jagged or very rough surface behind on the flanges where rupture is provided; nor should it deform the integral projections and recesses provided on either of the respective cover member and tray member flanges that are used for mechanical snap-fits permitting reclosure of the container components after they are unsealed from each other for the first time.

[0084] In addition to the above and subject to any requirements indicated herein, one or more layers of the sealant and or barrier films of the multi-layer films may also include one or more additives useful in packaging films, such as, antiblocking agents, slip agents,

flavorants, antimicrobial agents, meat preservatives, antioxidants, fillers, radiation stabilizers, and antistatic agents, and so forth. Such additives, and their effective amounts, are generally known in the art.

[0085] Referring to FIG. 13, in one embodiment, the tray member and the cover member are formed, filled, and sealed as a continuous in-line procedure **300**. A roll stock of a multi-layer web, such as described herein, may be used as the supply web for each container component. Separate webs may be conveniently processed on continuous and intermittent motion vacuum thermoforming machines, or comparable in-line forming equipment, to form the tray member and the cover member. For example, the tray member and the cover member may be separately manufactured from a suitable separate web that is shaped by thermoforming or other suitable plastic web shaping technique known in the art. Suitable thermoforming methods, for example, include a vacuum forming or plug-assist vacuum forming method.

[0086] In a vacuum forming method, a web is heated, e.g., by a contact heater and a vacuum is applied beneath the web causing the web to be drawn or pushed by atmospheric pressure down into a preformed mold. In a plug-assist vacuum forming method, after the first or forming web has been heated and sealed across a mold cavity, a plug shape similar to the mold shape impinges on the opposite side of the forming web and, upon the application of vacuum, the forming web transfers to the mold surface. A web thermoformed into the tray member may be deep drawn in this manner to form a receptacle having the base surface contour described herein for receiving shingled bacon (**301**). A separate web is thermoformed into the cover member (**302**). The respective webs may have the above-noted multi-layer film constructions.

[0087] The forming web which is shaped into the tray member structure is positioned in a manner suitable to receive a predetermined amount of shingled bacon, which is placed therein by manual or automated loading (**303**). A second separately thermoformed web corresponding to the cover member may be thermoformed into the appropriate shape with a similar method. The stiffness of the cover member may optionally be enhanced by embossing patterns into it, such as a rhomboid pattern.

[0088] The cover member web is positioned over the tray member web (**304**). The tray member, as filled with bacon, is then attached to the cover member, which has been separately formed, at their respective contacting peripheral flanges. For example, the cover member peripheral flange is contacted with the tray member peripheral flange in a

contiguous manner. The cavity containing the bacon which is enclosed within the two superposed webs has a vacuum pulled on it and then it is flushed with an inert gas (step **305**). Alternatively, this vacuum/flush procedure alternatively may be repeated one or more times, or only vacuum or inert gas flushing may be used alone. Another alternative method may be the use of an oxygen scavenger by itself or in combination with one of the previously mentioned methods.

[0089] The cover member and tray member preferably are then heat sealed at their aligned and contacting peripheral flanges (**306**) in a manner that may be manually peeled apart by a consumer. The resulting heat seal preferably extends continuously around the flanges to hermetically seal or enclose the shingled bacon within the package. In this manner, the cover member and tray member form a substantially gas- and debris-impermeable enclosure for the shingled bacon. The resulting heat seal bond made between the cover member and tray member is sufficiently strong to withstand the expected handling and use conditions of the container.

[0090] The cover member and tray member flanges preferably are fusion sealed together in a peelably adhered manner. Fusion sealing may be done with a heat-sealing device which may be brought into contact with the cover member and tray member flanges. The seal may be formed using heated jaws, heat-sealing bars, platens, or frames, which apply heat pressure to the top and bottom webs in the seal area. In particular, the transmission of heat to the sealant layers on the contacting peripheral flanges of the two container parts induces a tacky state in the sealant layers such that they intermix and join or weld together upon being cooled. Sealing may be obtained between the cover member and tray member flanges by a variety of different methods including, for example, use of thermal conductance, dielectric sealing, ultrasonic sealing, radio frequency sealing, laser sealing, or other energy sources which may cause the sealant materials to bond, fuse or otherwise seal.

[0091] The sealed packages may be labeled (step **307**), such as using conventional pressure sensitive food package labeling. In this embodiment, the individual sealed packages are then trimmed out of the superposed tray and lid webs (step **308**), and may be packaged, shipped, and or shelved in any convenient manner.

[0092] The inter-laminar bond strength of the layers making up each forming web should be greater than the adhesive strength of the sealant layers of the first and second webs. Therefore, the cover member and tray member may be relatively cleanly peeled

apart at the sealant layers at their respective flanges without leaving a jagged or rough separation surface on the flanges and without tearing or permanently deforming other structural features of the components, especially the snap-fittable projections and recesses. The snap fit projections are used to mechanically reclose the container after it has been unsealed and opened at the flanges.

[0093] While the invention has been particularly described with specific reference to particular process and product embodiments, it will be appreciated that various alterations, modifications and adaptations may be based on the present disclosure, and are intended to be within the spirit and scope of the present invention as defined by the following claims.